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QUALCOMM INCORPORATED
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EXAMINER	
BRIER, JEFFERY A	
ART UNIT	**PAPER NUMBER**
2628	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/617,455	QI ET AL.	
	Examiner	Art Unit	
	Jeffery A. Brier	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15,32-46 and 62-80* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-15,32-38,40-46,62-68 and 70-80* is/are rejected.

7)☐ Claim(s) *8, 39, and 69* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/17/2008 has been entered.

Response to Amendment

2. The amendment filed on 12/17/2008 has been entered.

Response to Arguments

3. Applicant's arguments filed 12/17/2008 at pages 17-28 concerning the obvious rejection based on Watkins and Pineda have been fully considered but they are not persuasive.

Watkins' spans (10a and 10b illustrated in figures 1 and 1A, 62 and 64 illustrated in figure 5, 120 and 122 illustrated in figure 7) is a rectangular area having traversal lines starting from one common edge of the rectangle area to the edge of the triangle after traversing the triangle.

Column 5 line 55 to column 6 line 13 states:

> In accordance with multi-level scanning operation, as each span 10 is treated in sequence (FIG. 1, scanline 14) the pixels 17 within it are

> scanned and processed. The scan processing of individual pixels 17 in the spans 10 is represented for the span 10a in FIG. 1A by a scanline 19. Dashed portions 19a are retrace or return strokes while solid portions 19b are processing strokes.
>
> To consider a sequence of operation in greater detail, assume that the span preceding the span 10a has been completed and the span 10a is now to be treated as illustrated in FIG. 1A. That is, the overall operation has proceeded to now treat the span 10a as the next in sequence.
>
> Of the sixteen pixels 17 within the span 10a, those lapped by the triangle T are selectively scan converted in a partial raster sequence as indicated by the line 19. Accordingly, the contribution of the triangle T to each lapped pixel 17 is determined. Specifically, the lapped pixels 17a (FIG. 1A, left of the triangle T edge 12) are scan converted in a partial raster pattern as indicated by the pixel scanline 19. Stated another way, those pixels 17b, completely to the right of the edge 12 (not affected by the triangle T), are not scan converted. Thus, in screen space, the multi-level system as disclosed, treats spans 10 in a partial raster sequence (FIG. 1), selectively scan converting the relevant pixels 17a in each span (FIG. 1A) to update the frame buffer FB (FIG. 1).

Pineda shows several embodiments of traversal lines within a rectangular area that bounds an entire triangle. One of ordinary skill in the art would recognize there is a finite number of ways to traverse the rectangular area that bounds an entire triangle. Selecting one of these ways would have been obvious to one of ordinary skill in the art at the time of applicants invention. KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385 (U.S. 2007), U.S. Supreme Court No. 04-1350 Decided April 30, 2007, 127 SCt 1727, 167 LEd2d 705.

In view of Watkins it would have been obvious to one of ordinary skill in the art to traverse from one end of a rectangular area and in view of Pineda it would have been obvious to one of ordinary skill in the art to bound the triangle with one rectangular area because:

1) It would have been obvious to one of ordinary skill in the art to use a single rectangular area (Watkins: span, Pineda: bounding box). Watkins at column 2 lines 53-54, column 5 lines 29-31, and column 8 lines 4-6 teaches the spans may be any number of pixels and various configurations such as rectangle. Pineda shows a single bounding box in figure 1 and single clip region in figure 6. Using a single rectangular area would have been obvious because using a single rectangular area (Watkins: span, Pineda: bounding box) is simpler than using a more complex arrangement of multiple bounding boxes as stated by Pineda in the paragraph above figure 3 on page 18.

2) It would have been obvious to one of ordinary skill in the art to start at one end of the single rectangular area (Watkins: span, Pineda: bounding box). Watkins shows in figure 1A starting at one end of rectangular area (Watkins: span, Pineda: bounding box). Starting at one end of the single rectangular area would have been obvious because searching for one edge of the triangle is simpler than searching for both edges of the triangle and which may save processing time while also saving processing time by not scanning pixels beyond the triangle edge after scanning the triangle.

The previous rejection based on Watkins is modified below to reflect claim amendments.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 4, 35, and 65 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In paragraph [0029] last two lines (on page 8) applicant wrote:

> Thus, rendering engine 12 applies the matrix Mc to the current pixel (Xc, Yc), and determines that the pixel is inside the triangle when all of el, e2, e3 are less than zero.

Applicant amended claims 4, 35, and 65 to claim

<u>wherein the rendering engine determines that the current one of the one or more pixels is within the triangular area when</u> the formula's results is less than or equal to zero, however, the specification states "less than zero" which does not convey equal to zero. Originally filed claims 4 and 21 do not covey this either. [1]

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1. [1] Applicant should note that without the added claim language to claims 4, 35, and 65 the previous 35 USC 112 second paragraph rejections to claims 4, 35, and 65 would apply.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 2, 5, 6, 9, 10, 11, 12, 15, 32, 33, 36, 37, 40, 41, 42, 43, 46, 62, 63, 66, 67, 70, 71, 72, 73, and 76-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watkins, US Patent No. 5,598,517, and in view of the Watkins

incorporated by reference article "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017.

Watkins scans a bounding box corresponding to cache memory block containing the triangle and ceases scanning the bounding box upon determining at least one pixel of the line falls within the triangle when the scanning reaches a pixel that is no longer in the triangle.

Watkins' spans (10a and 10b illustrated in figures 1 and 1A, 62 and 64 illustrated in figure 5, 120 and 122 illustrated in figure 7) is a rectangular area having traversal lines starting from one common edge of the rectangle area to the edge of the triangle after traversing the triangle.

> Column 5 line 55 to column 6 line 13 states:
>
> In accordance with multi-level scanning operation, as each span 10 is treated in sequence (FIG. 1, scanline 14) the pixels 17 within it are scanned and processed. The scan processing of individual pixels 17 in the spans 10 is represented for the span 10a in FIG. 1A by a scanline 19. Dashed portions 19a are retrace or return strokes while solid portions 19b are processing strokes.
>
> To consider a sequence of operation in greater detail, assume that the span preceding the span 10a has been completed and the span 10a is now to be treated as illustrated in FIG. 1A. That is, the overall operation has proceeded to now treat the span 10a as the next in sequence.
>
> Of the sixteen pixels 17 within the span 10a, those lapped by the triangle T are selectively scan converted in a partial raster sequence as indicated by the line 19. Accordingly, the contribution of the triangle T to each lapped pixel 17 is determined. Specifically, the lapped pixels 17a (FIG. 1A, left of the triangle T edge 12) are scan converted in a partial raster pattern as indicated by the pixel scanline 19. Stated another way, those pixels 17b, completely to the right of the edge 12 (not affected by the triangle T), are not scan converted. Thus, in screen space, the multi-level system as disclosed, treats spans 10 in a partial raster sequence (FIG. 1), selectively scan converting the relevant pixels 17a in each span (FIG. 1A) to update the frame buffer FB (FIG. 1).

Watkins fails to clearly teach "rectangular area of pixels that bounds an entire triangular are of the pixels that defines a triangle to be rendered" and "sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area".

Pineda shows several embodiments of traversal lines within a rectangular area that bounds an entire triangle. One of ordinary skill in the art would recognize there is a finite number of ways to traverse the rectangular area that bounds an entire triangle. Selecting one of these ways would have been obvious to one of ordinary skill in the art at the time of applicants invention. KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385 (U.S. 2007), U.S. Supreme Court No. 04-1350 Decided April 30, 2007, 127 SCt 1727, 167 LEd2d 705.

In view of Watkins it would have been obvious to one of ordinary skill in the art to traverse from one end of a rectangular area and in view of Pineda it would have been obvious to one of ordinary skill in the art to bound the triangle with one rectangular area because:

1) It would have been obvious to one of ordinary skill in the art to use a single rectangular area (Watkins: span, Pineda: bounding box). Watkins at column 2 lines 53-54, column 5 lines 29-31, and column 8 lines 4-6 teaches the spans may be any number of pixels and various configurations such as rectangle. Pineda shows a single bounding box in figure 1 and single clip region in figure 6. Using a single rectangular area would have been obvious because using a single rectangular area (Watkins: span, Pineda: bounding box) is simpler than using a more complex

arrangement of multiple bounding boxes as stated by Pineda in the paragraph above figure 3 on page 18.

2) It would have been obvious to one of ordinary skill in the art to start at one end of the single rectangular area (Watkins: span, Pineda: bounding box). Watkins shows in figure 1A starting at one end of rectangular area (Watkins: span, Pineda: bounding box). Starting at one end of the single rectangular area would have been obvious because searching for one edge of the triangle is simpler than searching for both edges of the triangle and which may save processing time while also saving processing time by not scanning pixels beyond the triangle edge after scanning the triangle.

A detailed analysis of the claim follows with underlining showing claim additions and strikethrough showing deletions.

Claim 1:

Watkins teaches an apparatus comprising:

a rendering engine that defines ~~a~~ <u>an entire</u> rectangular area of pixels that bounds a triangular area of the pixels <u>that defines a triangle to be rendered</u>, wherein the rectangular area of pixels includes one or more lines of pixels (*Column 2 lines 39-43, column 3 lines 14-20, figure 1A and column 5 lines 28-37 and 55-62, figure 5 and column 8 lines 6-15.*) (However, Watkins does not clearly teach "rectangular area that bounds an entire triangular are of the pixels that defines a triangle to be rendered".);

the rendering engine further selects each of the one or more lines of pixels within the rectangular area of pixels (*Column 5 lines 55-62 and column 8 lines 16-30.*),

sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the ~~triangle~~ triangular area, wherein the one end of the rectangular are is common for the sequential evaluation of each line of pixels (*Column 6 lines 1-13 and column 8 lines 23-40.*) (However, Watkins does not clearly teach "sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area".), and

ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the ~~triangle~~ triangular area and a current pixel no longer falls within the ~~triangle~~ triangular area (*Column 6 lines 1-13 and column 8 lines 23-40. See figure 1A. Also note the ACM article incorporated by reference at column 6 lines 48-62 and provided to applicant. "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017. This article clearly teaches in section 4 traversing a bounding box and ceasing the scan and "advance to the next line when it walked off the edge of a triangle". At least the article's edge function corresponds to the claimed "information indicating which of the pixels fall within the triangle area", see section 7.)* and

stores information indicating which of the pixels fall within the ~~triangle~~ triangular area (*Column 5 lines 5-14, column 6 lines 40-62, column 7 lines 25-50, and column 8 lines 20-30.*).

Watkins fails to clearly teach "rectangular area of pixels that bounds an entire triangular are of the pixels that defines a triangle to be rendered" and "sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area".

Pineda shows several embodiments of traversal lines within a rectangular area that bounds an entire triangle. One of ordinary skill in the art would recognize there is a finite number of ways exist to traverse the rectangular area that bounds an entire triangle. Selecting one of these ways would have been obvious to one of ordinary skill in the art at the time of applicants invention. KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385 (U.S. 2007), U.S. Supreme Court No. 04-1350 Decided April 30, 2007, 127 SCt 1727, 167 LEd2d 705.

In view of Watkins it would have been obvious to one of ordinary skill in the art to traverse from one end of a rectangular area and in view of Pineda it would have been obvious to one of ordinary skill in the art to bound the triangle with one rectangular area because:

1) It would have been obvious to one of ordinary skill in the art to use a single rectangular area (Watkins: span, Pineda: bounding box). Watkins at column 2 lines 53-54, column 5 lines 29-31, and column 8 lines 4-6 teaches the spans may be any number of pixels and various configurations such as rectangle. Pineda shows a single bounding box in figure 1 and single clip region in figure 6. Using a single rectangular area would have been obvious because using a single rectangular area (Watkins: span, Pineda: bounding box) is simpler than using a more complex

arrangement of multiple bounding boxes as stated by Pineda in the paragraph above figure 3 on page 18.

2) It would have been obvious to one of ordinary skill in the art to start at one end of the single rectangular area (Watkins: span, Pineda: bounding box). Watkins shows in figure 1A starting at one end of rectangular area (Watkins: span, Pineda: bounding box). Starting at one end of the single rectangular area would have been obvious because searching for one edge of the triangle is simpler than searching for both edges of the triangle and which may save processing time while also saving processing time by not scanning pixels beyond the triangle edge after scanning the triangle.

Claim 2:

Watkins teaches the apparatus of claim 1, wherein the rendering engine evaluates the coordinates of the pixels in accordance with a set of linear equations that describe edges of the triangular area (*The processing of determining if the pixel is within the triangle is a linear operation, column 5 lines 28-37, column 6 lines 48-62 and column 8 lines 23-30 since the raster format is two dimensional the equations are linear rather than non-linear. Note the ACM article incorporated by reference at column 6 lines 48-62 and provided to applicant. "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017. This article clearly teaches using linear equations to evaluate the coordinates, see page 19 section 7 first paragraph which states "Since the edge function is linear, it is possible to compute the value*

of the edge function for a pixel an arbitrary distance L away from a given point (x,y) :

E(x+L, y) = E(x) + L dy".).

Claim 5:

Watkins teaches the apparatus of claim 1, wherein the rendering engine selectively renders the pixels that fall within the triangular area by computing updated pixel data for those pixels in accordance with a set of linear equations that describe one or more attributes associated with the triangular area (*The processing of determining if the pixel is within the triangle is a linear operation, column 4 line 56 to column 5 line 5, column 5 lines 5-14, column 6 lines 41-48, column 7 lines 25-30, and column 8 lines 20-30 since the raster format is two dimensional the equations are linear rather than non-linear and since the delta values at column 6 lines 55-62 are used in linear equations. Note the ACM article incorporated by reference and provided to applicant. "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017. This article clearly teaches using linear equations to generate pixel values, see page 20 first column second paragraph which states "Since color and Z components are linear as well, they may also be computed in parallel.".*).

Claim 6:

Watkins teaches the apparatus of claim 5, wherein the attribute values comprise at least one of color values and texture values (*Color and texture is discussed at column*

4 lines 64-67, column 6 lines 55-62, column 7 lines 25-30, column 8 lines 20-22, figure 3 step 44, and figure 6 step 72).

Claim 9:

Watkins teaches the apparatus of claim 1, further comprising a z-buffer storing a set of z-values associated with the pixels, and wherein the rendering engine compares a z-value, z_c, of the current pixel with a corresponding z-value, z_b, of a z-buffer to determine whether each pixel within the rectangular area is visible and selectively renders each pixel of the rectangular area that is visible and that falls within the ~~triangle~~ <u>trianglular</u> area (*The visibility test compares a current pixel's z value with a predetermined value such as applicant's z-buffer value to determine if the pixel is visible such as when $z_c<z_b$.*).

Claim 10:

Watkins teaches the apparatus of claim 1, further comprising a control unit that issues a command to the rendering engine that specifies vertices of the triangular area (*GP, column 4 lines 30-37, column 9 lines 33-36.*).

Claim 11:

Watkins teaches the apparatus of claim 1, wherein the rendering engine comprises:

a vertex buffer for buffering the vertices of the triangular area to be rendered (*GP produces vertices which need to be buffered in rendering processor RP, column 4 lines 30-37, column 5 lines 24-27, column 6 lines 40-62,*);

a bounding box generator that processes the vertices to compute bounding data that define the dimensions of the rectangular area (*Column 2 lines 39-43, column 3 lines 14-20, figure 1A and column 5 lines 28-37 and 55-62, figure 5 and column 8 lines 6-15.*) (In response to applicants 12/06/07 argument: With reference to applicants specification at paragraph [0019] and figure 2 rectangular area 22A as well as triangle 20 applicants bounding box is also predetermined with regard to the video block of the cache memory which are based on a pre-determined number of pixels. Thus, the argument that "the dimensions of the span or panel, in Watkins, are not defined by the bounding data computed from the vertices" is not persuasive since the claimed rectangular area of claim 11 corresponds to video block of the cache, applicant paragraph [0019], and since Watkins rectangular area corresponds to video block of cache, Watkins column 2 lines 36-43, figures 1, 1A, 5, and 7. Therefore, both applicant and Watkins both use the vertices of the triangle to determine the rectangular areas, applicants bounding boxes 22A and Watkins spans or panels.); and

a rasterizer that processes the bounding data and evaluates coordinates associated with one or more of the pixel values of the rectangular area to selectively render pixels that fall within the triangular area (*RP renders pixels based upon the bounding data and pixel coordinate to render pixel values for the pixel that fall within the triangular area. Column 5 lines 5-14, column 6 lines 40-62, column 7 lines 25-50, and column 8 lines 20-30.*).

Claim 12:

Watkins teaches the apparatus of claim 11, further comprising:

an edge coefficient generator that receives the vertices buffered by the vertex buffer and processes the vertices to compute linear coefficients for a set of linear equations that describe edges of the triangular area (*The processing of determining if the pixel is within the triangle is a linear operation, column 5 lines 28-37, column 6 lines 48-62 and column 8 lines 23-30 since the raster format is two dimensional the equations are linear rather than non-linear. Note the ACM article incorporated by reference at column 6 lines 48-62 and provided to applicant. "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017. This article clearly teaches using linear equations to evaluate the coordinates that describes edges of the triangular area, see page 19 section 7 first paragraph which states "Since the edge function is linear, it is possible to compute the value*
of the edge function for a pixel an arbitrary distance L away from a
given point (x,y) :

E(x+L, y) = E(x) + L dy".) , and

an attribute coefficient generator that processes the vertices to compute linear coefficients for a set of linear equations that describe one or more attributes associated with the triangular area (*Color and texture is discussed at column 4 lines 64-67, column 6 lines 55-62, column 7 lines 25-30, column 8 lines 20-22, figure 3 step 44, and figure 6 step 72, as well as the Pineda article at section 7.*), wherein

the rasterizer processes the bounding data and the coefficients in accordance with the sets of linear equations to render the pixels that fall within the triangular area (*Column 5 lines 5-14, column 6 lines 40-62, column 7 lines 25-50, and column 8 lines 20-30.*).

Clam 15:

Watkins teaches the apparatus of claim 1, further comprising a cache memory to store at least a portion of the pixels within the rectangular area, wherein the cache memory has a block size (*Column 2 lines 37-43, column 3 lines 14-20, column 6 lines 17-40, and column 7 lines 14-16 and 60-65 discusses using a texture cache and a frame buffer cache and having the triangle area scanned corresponding to the cache organization. The article incorporated by reference "FBRAM: A New Form of Memory Optimized for 3D Graphics" published at Siggraph 94 by Deering, Schlapp and Lavelle and printed in the proceedings designated ACM-0-89791-667-0/94/007/0167, further teaches having the caches designed as squares or rectangles which corresponds to Watkin's spans 10a, 10b, 62, and 64 and panels 66 or 67, see column 8 lines 7-15.*), and the rendering engine defines the rectangular area as a function of the block size of the cache memory (*Column 2 lines 37-43 and column 3 lines 14-20 teaches to one of ordinary skill in the art the spans or panels are defined to correspond to the block size of the frame buffer cache memory.*). (In response to applicants 12/06/07 argument: Watkins at column 2 lines 39-43 states: "By scanning select primitive areas, the generated pixels can coincide to the needs of a particular frame buffer organization. Also by scanning select primitive areas in order, texture memory may be accessed in

relatively fast cache mode" and at column 3 lines 17-19 states: "In accordance herewith, for both a texture memory and the frame buffer, small, very fast cache memory maybe be utilized. In that regard, basic cache memories are well know and have been widely utilized". With reference to applicants specification at paragraph [0019] and figure 2 rectangular area 22A as well as triangle 20 and to Watkins column 2 lines 39-41and figures 1, 1A, 5, and 7 it is seen that Watkins and applicant both define the rectangular area as a function of the block size of the cache memory.)

Claim 77:

The apparatus of claim 1, wherein the rendering engine sequentially evaluates coordinates associated with the pixels of each line of pixels in a rightward and downward fashion. Watkins in figures 1A, 5, and 7 shows scanning in the rectangular area in a rightward and downward direction.

Claims 32, 33, 36, 37, 40, 41, 42, 43, 46, and 78:

These apparatus claims are very similar to apparatus claims 1, 2, 5, 6, 9, 10, 11, 12, 15, and 77 and they are rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. The means of Watkins is considered to be the same or equivalent to the claimed means.

Claims 62, 63, 66, 67, 70, 71, 72, 73, 76, and 79:

These computer program product claims are computer program product claim versions of apparatus claims 1, 2, 5, 6, 9, 10, 11, 12, 15, and 77 and they are rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. Additionally note column 3 line 66 to column 4 line 10.

9. Claims 3, 7, 34, 38, 64, and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watkins, US Patent No. 5,598,517, and in view of the Watkins incorporated by reference article "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017.

Claim 3:

This claim claims the method of claim 2, wherein the rendering engine computes a coefficient matrix M_C for computing linear coefficients for the set of linear equations; and

applies the coefficient matrix M_C to one or more pixels within the rectangular area to determine whether each of the one or more pixels falls within the triangular area.

Watkins teaches as discussed for claim 2 the processing of determining if the pixel is within the triangle is a linear operation, column 5 lines 28-37, column 6 lines 48-62 and column 8 lines 23-30 since the raster format is two dimensional the equations are linear rather than non-linear. Note the ACM article incorporated by reference at column 6 lines 48-62 and provided to applicant. "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017. This article clearly teaches using linear equations to evaluate the coordinates, see page 19 section 7 first paragraph which states "Since the edge function is linear, it is possible to compute the value of the edge function for a pixel an arbitrary distance L away from a given point (x,y) :

E(x+L, y) = E(x) + L dy".).

Both Watkins and the article incorporated by reference, "A Parallel Algorithm for Polygon Rasterization", does not expressly discuss computing a coefficient matrix M_C for computing linear coefficients for the set of linear equations and does not expressly discuss applying the coefficient matrix M_C to each of the pixels within the rectangular area to determine whether each of the pixels falls within the triangular area.

However, in view of the article computing and applying such a matrix as claimed would have been obvious to one of ordinary skill in the art at the time of applicants invention because the equations in the article in section 3 may be represented in a mathematically more simplified form by a coefficient matrix.

Claim 34:

This apparatus claim is very similar to apparatus claim 3 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. The means of Watkins is considered to be the same or equivalent to the claimed means.

Claim 64:

This computer program product claim is a computer program product claim version apparatus claim 3 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. Additionally note column 3 line 66 to column 4 line 10.

Claim 7:

This claim claims the method of claim 5, wherein the rendering engine computes ~~a~~ an inverse coefficient matrix M^{-1} for computing linear coefficients A, B, C of the set of linear equations; and

applies the linear coefficients A, B, C to each of the pixels that falls within the triangular area to compute an attribute value for each of the pixels.

Watkins teaches as discussed for claim 5 the processing of determining if the pixel is within the triangle is a linear operation, column 4 line 56 to column 5 line 5, column 5 lines 5-14, column 6 lines 41-48, column 7 lines 25-30, and column 8 lines 20-30 since the raster format is two dimensional the equations are linear rather than non-linear and since the delta values at column 6 lines 55-62 are used in linear equations. Note the ACM article incorporated by reference and provided to applicant. "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017. This article clearly teaches using linear equations to generate pixel values, see page 20 first column second paragraph which states “Since color and Z components are linear as well, they may also be computed in parallel.”.).

Both Watkins and the article incorporated by reference, "A Parallel Algorithm for Polygon Rasterization", does not expressly discuss computing a coefficient matrix M_C for computing linear coefficients of the set of linear equations and however Watkins does discuss applying the linear coefficients to each of the pixels that falls within the triangular area to compute an attribute value for each of the pixels as discussed above

for claim 6 (Color and texture is discussed at column 4 lines 64-67, column 6 lines 55-62, column 7 lines 25-30, column 8 lines 20-22, figure 3 step 44, and figure 6 step 72).

However, in view of the article computing a matrix as claimed would have been obvious to one of ordinary skill in the art at the time of applicants invention because the equations in the article in section 3 may be represented in a mathematically more simplified form by a coefficient matrix.

Claim 38:

This apparatus claim is very similar to apparatus claim 7 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. The means of Watkins is considered to be the same or equivalent to the claimed means.

Claim 68:

This computer program product claim is a computer program product claim version of apparatus claim 3 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. Additionally note column 3 line 66 to column 4 line 10.

10. Claims 13, 14, 44, 45, 74, and 75 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watkins, US Patent No. 5,598,517, in view of the Watkins incorporated by reference article "A Parallel Algorithm for Polygon Rasterization" published in Computer Graphics, Volume 22, Number 4, August 1988 by Juan Pineda and designated ACM-0-89791-275-6/88/008/0017, in view of applicant admission of the prior art. Claim 13 places claim 1 into a wireless communication device and claim 14

places claim 1 into an integrated circuit and claim 80 places claim 1 into a mobile phone.

Claim 13:

Applicant at pages 1 and 2 discuss using graphics renders in wireless communication devices. It would have been obvious to one of ordinary skill in the art at the time of applicants invention to use the teachings of Watkins in a prior art wireless communication device because it will provide the device with the advantages noted by applicant in the paragraph spanning pages 1 and 2 as well as paragraphs 6-10 at page 2. (In response to applicants 12/06/07 argument: the claimed invention covers Watkins for the reasons given above, thus, it would have been obvious for one of ordinary skill in the art to use the teaching of Watkins in wireless device for the same reason to use claim 1 in a wireless device.)

Claim 44:

This apparatus claim is very similar to apparatus claim 13 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. The means of Watkins is considered to be the same or equivalent to the claimed means.

Claim 74:

This computer program product claim is a computer program product claim version of method claim 59 and of apparatus claim 13 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. Additionally note column 3 line 66 to column 4 line 10.

Claim 14

Applicant at page 3 paragraph 2 gives many examples of applicants implementation which states: Processor 6 may take the form of an embedded microprocessor, specialized hardware, software, e.g., a control software module, or combinations thereof. Moreover, DSP 10, processor 6, rendering engine 12, as well as other components of mobile computing, device 2, may be implemented in one or more application-specific integrated circuits (ASICs), as multiple discrete components, or combinations thereof. Applicant at pages 1 and 2 discuss using graphics renders in mobile devices such as PDAs which inherently have integrated circuits. It would have been obvious to one of ordinary skill in the art at the time of applicants invention to use the teachings of Watkins in an integrated circuit because it will provide the device with the advantages noted by applicant in the paragraph spanning pages 1 and 2 as well as paragraphs 6-10 at page 2 in addition to allow for a device such as a PDA to be mobile.

Claim 45:

This apparatus claim is very similar to apparatus claim 14 and it is rejected for the same reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. The means of Watkins is considered to be the same or equivalent to the claimed means.

Claim 75:

This computer program product claim is a computer program product claim version of method claim 60 and of apparatus claim 14 and it is rejected for the same

reasons. Also note applicants remarks at page 17 under the heading New Claims filed on 7/3/2007. Additionally note column 3 line 66 to column 4 line 10.

Claim 80:

Applicant at pages 1 and 2 discuss using graphics renders in wireless communication devices which includes mobile phone. It would have been obvious to one of ordinary skill in the art at the time of applicants invention to use the teachings of Watkins in a prior art wireless communication device such as a mobile phone because it will provide the device with the advantages noted by applicant in the paragraph spanning pages 1 and 2 as well as paragraphs 6-10 at page 2. (In response to applicants 12/06/07 argument as they may apply to this claim: the claimed invention covers Watkins for the reasons given above, thus, it would have been obvious for one of ordinary skill in the art to use the teaching of Watkins in wireless device for the same reason to use claim 1 in a wireless device.)

Allowable Subject Matter

11. Claims 8, 39, and 69 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record fails to teach or suggest the claimed method of using the claim matrices in calculating the attribute value for each pixel of the triangle in the context of the claims 8, 39, and 69 and the intervening claims.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffery A. Brier whose telephone number is (571) 272-7656. The examiner can normally be reached on M-F from 7:30 to 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached at (571) 272-7661. The fax phone Number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jeffery A. Brier/
Primary Examiner, Division 2628